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quency and violence of lightning to the different parts of the storm-area, or for discovering its possible preference for one or another topographical or geological district when it 'strikes.' Some of these points have been studied in Europe, but much remains to be done even there. Indeed, there is no department of meteorology in which local and closely placed observers can attain an end so distinctly original, and so far out of reach of the government service, as in this; and ten years' observations from stations near one another, and numerous enough, would yield results of the greatest practical and theoretical interest.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Mr. Francis Galton's proposed 'family registers.'

MANY obliging letters reach me from America, offering family information for my use, of the kind described by my friend, Mr. Henry F. Osborn, in your issue No. 39, as that which I want.

The scheme there described is one that I circulated to gather opinions and to obtain guidance before determining its precise form. This is now done, and with your permission I will say a few words upon it.

The information wanted applies to so many different individuals in the same family group, and differs so much in minuteness, according to the degree of kinship, and it has to be arranged in so special a manner, that a copious explanatory description and numerous tables are requisite. There is no real complexity; nevertheless, I feel assured, that, without considerable guidance, endless mistakes will arise. Correspondents will send pages of useless matter; and, on the other hand, they will be silent about simple facts, the absence of which will seriously diminish the value of otherwise copious returns. I therefore found it necessary to prepare a book containing a full account and explanation of what was wanted, in order to exhibit the various hereditary tendencies that converge upon any given person, and containing at the same time all the necessary schedules. This I have done: it is in the press, and will be published about Christmas by Macmillan, and will be procurable in America.

As regards the prize scheme, I found it inadvisable to restrict it to medical men, and I have thrown it open to 'British subjects resident in the United Kingdom.' I could not extend it farther, owing to the extreme difficulty of verifying statements of facts alleged to have occurred abroad. My self-imposed task will be hard enough as it is. The conditions of the prizes are fully explained in a fly-leaf to the English edition.

Let me take this opportunity of saying a few words about another book to which my name is attached as editor, and which will appear at the same time. It is called the 'Life-history album,' and was prepared by a sub-committee, of which I was asked to be chairman, who acted by direction of the Collective investigation committee of the British medical

association. This book gives explanations and schedules for the registration of *personal* data as life advances, just as the *Record* gives for a comprehensive account once for all of *family* data; the details, however, being very different in the two books: they are much more medical in the 'Album.' It is believed by the Life-history sub-committee that the medical value to the possessor, of his own life-history up to date, would be considerable, and of great service to the children. They also feel, that, if these albums are commonly kept, it will be possible hereafter to obtain extracts of a great many of them for purely statistical purposes, which would be of high scientific value. The albums will contain a vast amount of information which is now left to perish, and the lack of which is a great hindrance to obtaining that complete and comprehensive knowledge of the family antecedents of numerous persons, which is at present the paramount desideratum to inquirers into heredity.

I shall be very grateful to any of your readers who may see my forthcoming 'Record of family faculties,' and may make themselves acquainted with what I want, who will send me information concerning their own families. But I cannot explain my wants with sufficient brevity either here or by letter, and must, perforce, refer those who care to know them to the book itself.

FRANCIS GALTON.

42 Rutland Gate, London, December, 1883.

The red sunsets.

I have recently noticed several articles upon the gorgeous sunsets lately seen in this country, and desire to put down a few notes on the same.

The red glare was so brilliant the evening of Nov. 27, that the fire-alarm was sounded in New Haven, Conn., calling out the engines. On the succeeding night the deep red glow was magnificent, appearing far above blocks in the busiest part of the city. Careful observation has shown the phenomenon very nearly as brilliant at sunrise as at sunset. The deep red has appeared the last of all the *colors* in the sky at sunset, and invariably the first in the morning. There has been, in addition to this, a grayish afterglow at night, and in the morning a slight effulgence betokening the rising sun. This afterglow, or effulgence, has made it possible to observe the sky directly at the region where the deep red had just appeared, or was soon to appear; and this invariably showed fine fleecy clouds at a great height, generally stratified horizontally, and extending with slightly increasing density to the south-west or south-east horizon. These light stratified cloud-appearances were visible, even though the sky appeared absolutely cloudless a few minutes before and after the effulgence. The stars the past month have shown, night after night, most extraordinary twinkling, and the air has been saturated with moisture. Again and again, with a high barometer and a perfectly clear sky, sometimes even with a cold north-west wind, I have been astonished to find the relative humidity a hundred per cent.

As to a probable explanation, the wildest theories have been advanced: meteors, cosmical dust, zodiacal light, comets, electricity, volcanic gases and ashes, etc., have each had their adherents. Of these, the last is the only one worthy of consideration. The recent (?) eruptions at Java, 11,000 miles distant, are advanced as a sufficient cause for the presence of the ashes.

That volcanic ashes may be carried great distances is well known. Loomis's 'Meteorology,' p. 77, gives an instance in which ashes were carried 700 miles to the north-east and 1,200 miles to the west of the volcano Coseguina. Notwithstanding this evidence, it

would seem well-nigh incredible that the upper currents and the power of suspension of the ashes could have combined in carrying the particles 11,000 miles.

Common cloud-coloring is caused by diffraction from particles of dust or water-droplets. Light of different wave-lengths has a greater or less power of passing through dust, smoke, water-droplets, ice-spicalae, etc. It is stated that the light at the blue end of the spectrum has less power of penetration than at the red end: hence the light is sifted out, as it were; and the blue disappears first, then the orange, and, last of all, the red (Scott's 'Meteorology,' p. 205). Why may it not be possible that the blue, having the greater refrangibility, is refracted to such an extent as to be intercepted by the earth long before the red has disappeared? Taking into account the great abundance of moisture, the appearance of ice-spicalae (which, however, may have been volcanic ashes), and the fact of the appearance being precisely similar to that ordinarily seen upon clouds, there is no necessity of resorting to the at best doubtful theory of the volcanic origin of the phenomenon.

The similarity between the ordinary sunset and this phenomenon was finely illustrated one evening by a magnificent red-cloud sunset, manifestly caused by clouds comparatively near the observer. These clouds, gradually fading away, were followed by the deeper red so prominently noticed recently, and evidently produced by ice-spicalae at a great distance.

G. A. N.

On the evening of Dec. 22 a red glow was noticed upon the clouds which overspread the whole heaven. On the 23d the cloudiness was complete, and even denser than on the previous evening; but the glow tinged the whole visible vault down to the eastern horizon, and continued for at least an hour after sunset, fading first in the east. On the 24th the clouds were slightly broken. Before 5 P.M. (standard time) a yellowish tinge began to be apparent. At 5.10 the color was reddish, and reached the horizon on all sides. At 5.20 the color was a deeper red, with clouds more broken. At 5.30 the clouds were thin, and showed faint but distinct blood-red color on the eastern horizon, though a little brighter in the west. At 5.40 the cloudiness was reduced to a partial thin film, but a dusky redness was still perceptible in all parts of the sky. At 5.55 the sky was everywhere thinly veiled, but a dark ruddy tint could still be faintly seen all around the horizon. At 6.10 the sky was mostly cloudless, though few stars were visible. A dark-red glow could be discerned in all parts of the heavens, and in the west it rose in broad, ill-defined bands from the position of the sun. At 6.20 no clouds, but only stars of first three or four magnitudes were visible. At first no ruddiness was seen, but shortly it became unmistakably apparent. It was a faint dusky red still obscurely barred in the west. This glow lasted two hours and eight minutes after sunset: atmosphere calm; thermometer sinking from 28° to 25° F. The observations possess interest in connection with similar ones recently made in various parts of the world.

ALEXANDER WINCHELL.

Ann Arbor, Dec. 25, 1883.

Plant distribution in Lower California.

I would call attention to the fact, that many Arizonian, New Mexican, and Mexican species of plants, together with more northern species, are found on the narrow strip of tablelands in northern Lower California. Among them I may mention *Quercus Emoryi* and *Q. pungens*, *Astragalus Sonorae*, *Fouquieria splendens*, and many others, with *Geranium*

caespitosum of the Rocky Mountains, *Ivesia Baileyi* of Nevada, *Galium pubens*, *Quercus agrifolia*, the common *Pteris*, *Aquilegia truncata*, and a number of introduced (?) species well known throughout the United States.

CHARLES R. ORCUTT.

San Diego, Cal., Dec. 15.

Kames near Lansing, Mich.

A few years since, I spent one or two days at Mason, some ten miles south of Lansing, Mich. I had hoped to return at some future time, and complete my observations upon some peculiar ridges of sand, gravel, and bowlders in the vicinity of that village; but, as it may be some years before I shall be able to do so, I would like to lay the observations before the readers of *Science*, hoping that some of the Michigan readers may have time to investigate the subject fully.

The surface is here nearly plane. The front moraine of the Saginaw glacier lobe lies some thirty-five miles to the south-south-east, beyond Jackson. These ridges trend towards this moraine from some unknown point north of Mason to another unknown point ten or more miles south-south-east. I was informed that some of these ridges were six and eight miles in length, and are sometimes used as a highway. The drainage is to the northward at present, parallel with the course of the ridges, though I noticed one or two instances where creeks had intersected the ridges instead of being guided by them. The ridges seemed to persist in a northerly course, though with many local exceptions. I noticed one instance in which the main ridge turned nearly at an angle of 100°; but the main course was continued farther north in the heavier ridge, and at the elbow by a much lighter one. The ridges are quite variable in elevation. Perhaps the mean lies between twenty and thirty feet. The slope was not measured, but is, as a rule, too great to permit their being crossed by teams at the natural grade. The component material is all water-worn, and evidently deposited through the agency of water. The bowlders are of all sizes, up to twelve inches. Perhaps forty per cent were sandstone, similar in lithological characters to the subjacent rock strata. The remainder were metamorphic or igneous species, except some limestone pebbles.

Whether these ridges were formed in the longitudinal crevasses and river-channels of the ancient glacier, or not, must be determined by a more careful survey of the region than the writer was able to make in the few days spent at Mason.

L. C. WOOSTER.

Eureka, Kan., Dec. 17, 1883.

Longevity in a fasting spider.

On the fifteenth day of October, 1881, I enclosed a spider in a small paper box. From that day to the seventh day of May, 1882 (204 days), I carefully watched and daily inspected the prisoner, and can positively affirm that he partook of no food or water. The box in which he was confined was as clean and white as white paper could make it, and remained so while he continued to occupy it, except for the appearance of a few dark specks which I suppose to be the droppings of the prisoner. I carefully observed him every day, and sometimes two or three times in a day; and I was unable to detect any emaciation or symptoms of weakness, or even irritability of temper, while he lived. He always appeared as active, and looked as plump and healthy, as he did the day I dropped him into the box, until within three days of his death, when I first observed that when the box was tipped he would fall from his position.

WILLIAM JONES, M.D.

Newburgh, N.Y.